Changing Trends of Drug Initiation among People who Inject Drugs in the ALIVE Study

by

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Abstract:

This study assessed whether or not the initial drugs and routes of administrations of people who inject drugs (PWID) in Baltimore have changed over time. With over 2 million PWID in North America, injection drug use is an important public health problem. Recent studies suggest that the pathway towards injection drug use is changing, with younger PWID having first abused prescription opioids rather than non-injected cocaine or heroin, which has been the traditional pathway. In this study we characterized 1,005 participants of the AIDS Linked to the IntraVenous Experience (ALIVE) study, a community-based cohort of current and former PWID in Baltimore. We identified three distinct patterns of drug use initiation: those who initiated directly with injection drugs, those who initiated drug use with non-injected cocaine or heroin, and those who initiated with prescription opioid use. Of the 1005 participants, 211 (21%) initiated drug use with prescription opioid pills, 605 (60%) initiated with non-injected cocaine or heroin, and 189 (19%) directly with injection drug use (56% with heroin, 28% with cocaine and 16% with a combination of cocaine and heroin). Demographic and risk behaviors were compared across drug initiation groups. Participants 33 years of age were significantly more likely to have initiated with non-injected cocaine or heroin, or directly with injection drug use, while younger participants (25 years of age) were more likely to initiate with prescription pills obtained on the street. While time to injection drug use initiation was not significantly different across groups, participants who initiated with prescription opioid use differed with respect to other factors. Participants who initiated drug use with prescription drugs were mostly white, younger than those who initiated via injected drug use, and had a lower prevalence of HIV and HCV infections compared to those who

initiated via non-injected cocaine or heroin. One limitation of this study is that as we only observed PWID, there may be people abusing prescription opioids who do not transition to injection drug use. Future studies should observe this transition more closely, and physicians and public health practitioners should be aware of these changing trends in injection drug use initiation.

Readers: Dr. Shruti Mehta, PhD, MPH; Dr. Susan Sherman, PhD, MPH

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Background:

Injection drug use is commonly associated with an increased risk or morbidity and mortality.[1] There are approximately 16 million PWID worldwide, 3 million of whom are estimated to be HIV infected.[2] Moreover, the sharing of unsterilized needles and other paraphernalia used for injection drug use can lead to the transmission of other blood borne pathogens such hepatitis B virus (HBV) and hepatitis C virus (HCV) infection, which like HIV can result in chronic disease.[1] HIV, in particular, is notable in that approximately 30 percent of global HIV infections outside of sub-Saharan Africa are the result of injection drug use.[2] Hepatitis C is notable because it is estimated to be ten times more infectious than HIV and affects up to 80% of PWID and 90% of HIV-infected PWID.[3,4] Because HIV is also sexually transmitted, and there tends to be overlap between PWID and their sexual partners, injection drug use can serve as a mechanism for further spread of the virus into at-risk populations. Harm reduction strategies including opiate substitution therapy and needle exchange programs have been shown to decrease the transmission of blood borne pathogens, particularly HIV, among PWID.[2]

Generally, PWID do not initiate drug use with injection. There is more often a pathway towards injection drug use that starts with other substance use, typically by a non-injection route. In prior studies, the trend has been observed as moving from non injection heroin or cocaine use to injection of heroin and/or cocaine.[5,6] Several risk factors for transitions into injection drug use have been identified among those using other drugs including race other than African American, male sex, early drug initiation, and early alcohol and cigarette initiation.[6]In North American there are approximately 2.3 million PWID, and the most commonly injected drugs are heroin and cocaine.[2] There

have been reports of a shift in the epidemiology of drug use in the US. In particular, there has been an increase in prescription drug use that has been increasingly reported outside of urban settings[7]. In some settings prescription drugs are being injected and in others transitions to injection of other drugs has been reported and has been associated with high rates of hepatitis C virus and other morbidity[8].

Adolescents who inject drugs have distinct risk considerations from older PWID, making it crucial to consider these differences in analysis rather than grouping all PWID together. In particular, adolescent PWID often have a shorter duration of drug use before injection initiation than older PWID. Moreover, studies have found that homelessness as well as exclusive crack smoking prior to initiation and marijuana use have been associated with an increased risk of transitions into injection drug use in adolescents.[9,10] Among drugs which are injected, most adolescents first inject heroin alone before other injection drugs, and generally have inhaled cocaine or heroin before beginning to inject.[1] As younger people are more likely to exhibit high risk behaviors, such as needle sharing, HIV transmission is of concern for this group.[11] Recent studies have found that younger PWID are more frequently initiating drug use with prescription opioid misuse before transitioning into other illicit drugs and, eventually, injected drugs.[12,13] Observing changes in how younger participants are initiating injection drug use is valuable information for public health endeavors. Efforts should be made to understand changes in drug initiation patterns in order to design intervention techniques that are up to date with the current trends.

Baltimore has an estimated 336 PWID per 10,000 people aged 15-64, making it the city with the highest per capita prevalence of injection drug use in the country.[14]

Moreover, death rates in Baltimore City in 2012 for heroin use was 20 per 100,000 people, while death by prescription opioid use was 10 per 100,000 people.[15] Historically, the most common drugs of abuse have included heroin, cocaine and crack. The goal of this analysis was to explore changes in drug initiation pathways over time, as well as differences in PWID in Baltimore by age and injection pathway.

Methods:

Study Population

The ALIVE (AIDS Linked to the IntraVenous Experience) Study is a longitudinal community based cohort of current and former PWID in Baltimore, Maryland as previously described[16]. The ALIVE study was originally designed to study the progression and management of HIV in PWID, but now also assesses common co-infections (such as Hepatitis C) and the impact of highly active antiretroviral therapy (HAART). Participants in the ALIVE study are followed semi-annually, where clinical, laboratory, and behavioral data are collected. Recruitment for the ALIVE study was originally conducted between 1988-89, and has since again opened up in waves in 1994-95, 1998, and from 2005-2008. In order to be eligible for the ALIVE study, participants needed to be at least 18 years of age, HIV negative, and have a baseline history of injection drug use. Until the 2005-2008 recruitment cycle, participants were not asked specifically about illicit prescription drug use. This analysis was conducted among the 1005 participants who enrolled in 2005-2008. Inclusion criteria for this analysis included the availability of drug initiation category data and enrollment in the ALIVE study cohort.

Data Collection

For the ALIVE study, during baseline visits, surveys are used to collect data on lifetime and recent risk behavior, baseline status of education, income, employment, and lifetime history of drug use. During semiannual study visits, demographic and social factors are evaluated, including frequency, route and types of drugs injected, medical history, HIV risk behaviors, and drug treatment. Moreover, participants are counseled, assisted in finding social services for which they qualify, and given information of other studies they may be eligible for. Laboratory results, including HIV and HCV antibody tests, HIV viral loads, and CD4 T-cell counts are obtained via blood draw.

Statistical Analysis

Participants were classified into one of three groups according to the first drug that they reported using other than alcohol or marijuana as well as the route of administration. The first group included those that reported no non-injection drug use prior to injection (injection first). The second group included those that reported non-injection cocaine (including crack) and/or heroin as their first drug (non-injection cocaine/heroin) and the third group included those that started with some sort of prescription drug (prescription drugs). The latter group included persons who reported starting drug use with any of the following drugs purchased on the street: oxycontin, buprenorphine, percocet, benzodiazepines or clonidine. We first compared these three groups with respect to demographic characteristics and risk behaviors using Pearson chi-square.

A retrospective time-to-event survival analysis was conducted in order to understand whether among persons who initiated drug use with a route other than

injection, the time to injection initiation differed by drug of first use. Here, the time metric used was years, and entry was defined as the age of the participant at the time of first non-injection drug use (other than marijuana or alcohol use). All persons had the outcome of interest as all persons in this analysis had injected drugs prior to enrolling in the study. Persons were considered to have the event at their self-reported age of first injection drug use. This analysis included 816 participants (all participants excluding those who initiated drug use with injection drugs). There were 236 participants who began injecting drugs within the year of their first drug use. These participants were coded as contributing six months of person time. Survival analyses included Kaplan-Meier survival curves with a log-rank test and Cox regression analysis to adjust for covariates.

Results:

Participant Characteristics

Characteristics of study participants (N=1,005) are summarized in Table 1. Of the total sample, 189 (19%) initiated drug use with a drug that was injected (56% with heroin, 28% with cocaine and 16% with a combination of cocaine and heroin). 605 (60%) initiated with non-injection cocaine or heroin and 211 (21%) initiated drug use with prescription drugs obtained on the street. Overall, the mean age of initiation of drug use was similar across the three groups. While a majority of participants who initiated drug use with either injection drugs or with non-injected cocaine or heroin were black, this demographic accounted for only 37% of participants who initiated with prescription opioids ($p<0.001$). Participants who initiated with injection drugs were also significantly

less likely to have a high school education at baseline than those who initiated with non-injection drug use, as well as a higher prevalence of HIV and HCV ($p<0.05$ for all). All three groups had similar average ages of alcohol and cigarette initiation, however the group that initiated with injection drugs had a slightly higher average age of marijuana initiation, but this difference was not statistically significant.

Risk behaviors

Drug initiation groups were also compared with respect to other risk behaviors reported. Statistically significant differences between the three groups were found in drug use, homelessness, incarceration, and HIV and HCV prevalence. Participants who initiated with pills were significantly less likely to have ever been in prison than those who initiated with injected drugs or those who initiated with non-injected cocaine or heroin ($p<0.001$). Compared to the group that initiated with injection drugs, the group that initiated drug use with prescription drugs had a higher prevalence methamphetamine use ($p=<0.001$). The group that initiated with injection drugs, however, reported higher prevalence of prior speedball injection. This information is summarized in Tables 2 and 3.

Persons < age 33 were significantly more likely to have initiated drug use with a prescription pill than older age ranges. Time to initiation of injection drug use was not significantly between the non-injected cocaine/heroin and pills drug initiation groups ($p=0.246$), however, participants who initiated with prescription pill use differed with respect to other factors. Participants in the pill group were significantly more likely to be younger, white, and more likely to be male in addition to having lower prevalence of HIV

and incarceration and a higher prevalence of crystal meth use. This information is summarized in Tables 2 and 3.

Injection Drug Initiation Pathways

We explored patterns in injection drug initiation pathways by using current age as a proxy for time. The oldest participants (age 48 and higher) had the largest prevalence of drug initiation with an injected drug followed by non-injection cocaine/heroin use, while younger participants (under age 25) were significantly more likely to initiate with prescription pills obtained on the streets. Participants were separated into age categories in six year intervals for participants aged 36 and up, and four year intervals for those aged 35 and below. Current age was strongly associated with drug initiation group. Among those under age 25, 60% initiated with prescription drugs, 35% with non-injection cocaine or heroin, and 5% with injection drug use. Of the participants aged 33-35, 19% initiated with prescription drugs, 72% initiated with non-injection cocaine or heroin, and 9% with an injected drug. In contrast, among participants age 48 or older, 15% initiated with prescription drugs, 51% with non-injection cocaine or heroin, and 34% with injection drug use. This data is summarized in Figure 1.

Trends in transition to injection drug initiation

Participants who initiated drug use with prescription opioids appeared to have a longer time between the initiation of drug use and the initiation of injected drugs compared to those who initiated drug use with non-injection cocaine/heroin; however these differences were not statistically significant. These results are displayed in Figure 2.

Further time to event analysis for time from drug initiation to injected drug initiation revealed that the time to initiation of injection was the same in both groups (unadjusted p-value = 0.343). There was no difference between the two groups even after adjusting for other factors associated with time to injection initiation including age, race, sex, ages of cigarette, alcohol, and marijuana initiation, employment, and high school education (adjusted relative hazard: 0.936; 95% confidence interval: 0.773-1.134). Among these, the only significant result was found for initiating injection drug use at an early age (p-value = 0.000). Notably, there was still no notable effect on hazard ratio for injection drug initiation comparing those who initiate with pills versus those who initiate with prescription opioid abuse (Hazard ratio = 1.09, p-value = 0.404). Sensitivity analysis, in which time was treated as a continuous variable using linear regression, also showed no difference between the groups.

Discussion:

We observed a trend in which younger PWID in Baltimore tended towards initiating drug use with prescription drug use.[12,13] While older injectors (aged 36 and up) in this sample tended to initiate drug use with cocaine and/or heroin by injection or non-injection, there was a trend for younger drug users (aged 28 and below) to initiate injection with prescription drugs purchased on the street. This younger group has a different profile with respect to race, sex and other risk behaviors than their older counterparts. Despite this difference in initiation pathway, the time from drug initiation to injection drug use was similar regardless of how the individual initiated drug use.

Moreover, groups varied with respect to certain demographic and drug use characteristics.

Injection drug use is a widespread public health problem, particularly in Baltimore, that contributes to the spread of HIV as well as HCV infection.[5] Due to the large prevalence of injection drug use, it is crucial to aim interventions at preventing injection drug use initiation. While previous studies have shown non-injected cocaine/heroin use to be predictive of injection drug initiation[6], more recent studies have suggested that prescription opioid misuse is becoming an increasingly common pathway to injection drug initiation. This analysis provides further evidence of this new pathway among younger participants. It was interesting that initiating drug use with prescription drugs as opposed to cocaine or heroin did not seem to alter the time to first drug injection. While there was low sample size in the younger age groups, the trend was consistent across all those below 35 years of age.

While similar in many respects, there are some notable differences between these groups. Participants who initiated drug use with opioid pill abuse were more likely to be employed at baseline, much more likely to be white, and had a lower Hepatitis C prevalence at baseline. This group also had a much higher prevalence of crystal meth use, which may reflect either a surge in recent crystal meth use, or demographic and social differences between participants who initiated in this manner and participants who initiated with non-injected cocaine or heroin.

Survival analysis did not demonstrate any significant difference in time to injection drug initiation between the groups who initiated drug use with non-injected cocaine/heroin and those who initiated with prescription drug use. Neither alcohol use

(p-value = 0.776), cigarette use (p-value = 0.728), nor marijuana use (p-value = 0.533) had statistically significant impact on the hazard ratio for time to injection drug use comparing those who initiated drug use with pills versus those who initiated with non-injected cocaine or heroin. Sex, race, education, employment, and drug initiation group were not predictive of differences in time to injection drug use. After controlling for a variety of cofactors, the only item which appeared predictive of a shorter time to first injection drug use was a participant being under age 25. Sensitivity analysis for time to injection drug use demonstrated a statistically significant increase in time to injection drug use; however this is likely due to the increased average age of marijuana initiation in the group which initiated drug use with injection drugs (p=0.023).

Some limitations of this study include the fact that it is based on the results of a single study site, and is thus limited to the population of the Baltimore area. This may affect the generalizability of the study as the urban, predominantly African American Baltimore population may not be representative of other parts of the country with different demographics and social trends. Additionally, this analysis was heavily reliant on self reported drug use data, and is subject to recall bias. Moreover, we did not sample pill users and then identify which among them transitioned into injection drug use; rather in this secondary data analysis we observed PWID and retrospectively determined who initiated drug use with prescription opioid abuse. There may be many others who initiate drug abuse in this manner who do not transition into injection drug use. Further studies should observe a large cohort of participants who abuse prescription drugs, and then follow them for injection drug use initiation.

Conclusions:

While there was no significant difference in the time to first injection drug use by drug initiation category, participants who initiated drug use with prescription opioid pills have a distinct set of risk factors and demographic characteristics from those of the other two drug initiation pathways. A majority of these participants are younger, white, and have a decreased prevalence of HIV, HCV, and prison time. The HIV and HCV prevalence are partially attributable to being a younger cohort of participants, who have had less time than the other two groups to acquire a blood borne pathogen. However, despite this being a younger cohort, these participants also have an increased prevalence of crystal meth use.

Care should be taken when designing public health interventions to consider these changes in injection drug use initiation to better capture the modern audience. As studies continue to observe young patients transitioning into injection drug use from prescription opioid abuse, this rising drug initiation pathway should be considered by physicians and public health practitioners alike. While there are still significant amounts of new PWID who initiated drug use with non-injected cocaine or heroin, the growing cohort of those abusing prescription opioids and then transitioning to injection drug use need be considered. Future studies should observe this cohort more closely to determine points at which to intervene before the prescription drug use becomes problematic.

Tables and Figures:

Table 1 – Demographic Data			
Drug Initiation Group	**Pills**	**Non-Injected Cocaine/Heroin**	**Injection Drugs**
N	211	605	189
Mean age (SD)	38.11 (10.33)	41.95 (8.57)	48.1 (7.30)
Mean age of drug use initiation (SD)	17.8 (5.16)	19.2 (5.73)	18.1 (4.88)
Mean age of Injection Drug Use Initiation (SD)	22.7 (7.07)	23.6 (7.79)	18.1 (4.88)
Sex Men Women	146 (69.19%) 65 (30.81%)	363 (60%) 242 (40%)	143 (75.66%) 46 (24.34%)
Race White Black	132 (62.56%) 79 (37.44%)	182 (30.08%) 423 (69.92%)	21 (11.11%) 168 (88.89%)
High School Education at Baseline	96 (45.5%)	269 (44.46%)	67 (35.45%)
Currently employed	27 (12.80%)	44 (7.28%)	12 (6.38%)
Income <$5000	168 (80.77%)	470 (78.73%)	143 (77.30%)
Baseline HIV Prevalence	36 (18.18%)	175 (30.7%)	67 (37.43%)
Baseline HCV Prevalence	155(73.46%)	456 (75.50%)	179 (94.71%)

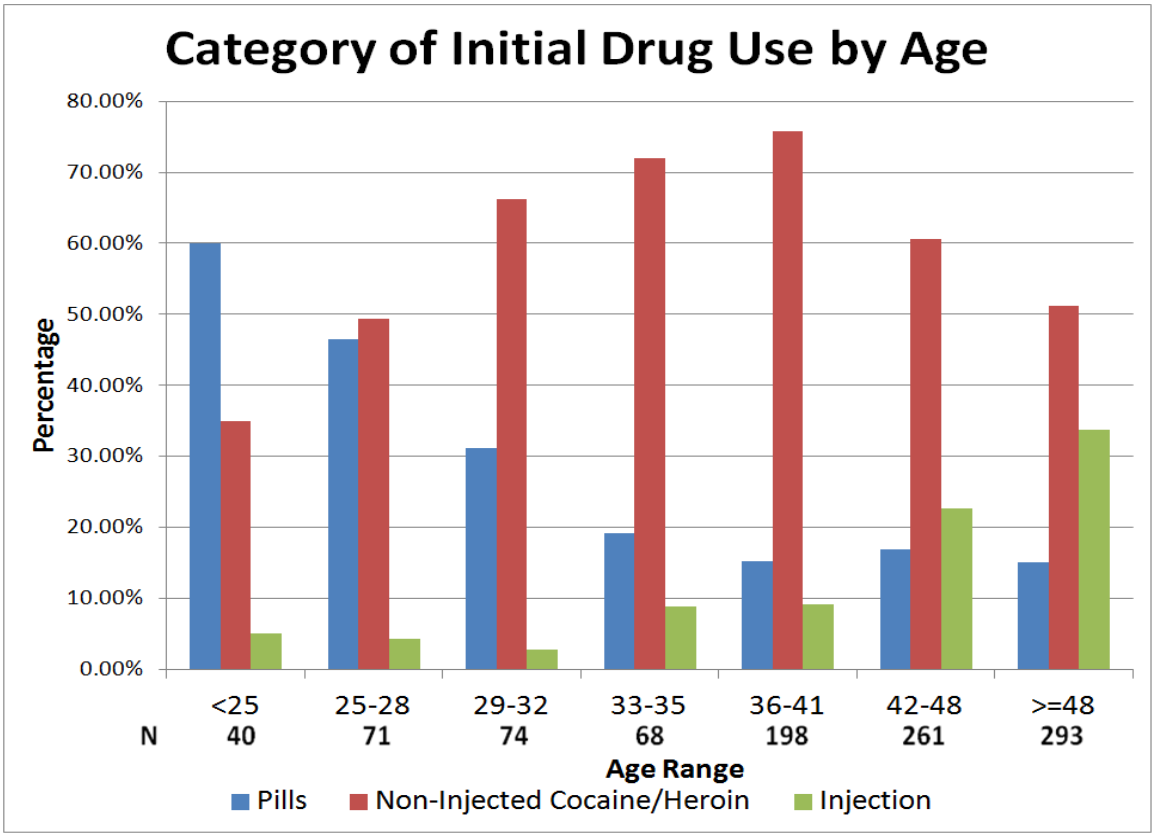

Figure 1 - Drug Initiation by Age Range

Table 2 – Demographic Differences Between Pill and Non-Injected Cocaine/Heroin Groups			
Drug Initiation Group	**Pills**	**Non-Injected Cocaine/Heroin**	**P-Value**
Mean age (SD)	38.1 (10.3)	41.95 (8.57)	**<0.001**
Mean age of drug use initiation (SD)	14.6 (3.73)	15.03 (3.71)	0.122
Mean age of non-marijuana drug use initiation (SD)	17.8 (5.16)	19.2 (5.73)	**0.002**
Mean age of Injection Drug Use Initiation (SD)	22.7 (7.07)	23.6 (7.79)	0.133
Time from First non-marijuana Drug Use to Injection Drug Use (SD)	5.68 (6.22)	5.11 (6.03)	0.246
Sex Men Women	146 (69.19%) 65 (30.81%)	363 (60%) 242 (40%)	**0.018**
Race White Black	132 (62.56%) 79 (37.44%)	182 (30.08%) 423 (69.92%)	**<0.001**
Baseline High School Education	96 (45.5%)	269 (44.46%)	0.795
Currently employed	27 (12.80%)	44 (7.28%)	**0.015**
Income <$5000	168 (80.77%)	470 (78.73%)	0.532
Baseline HIV Prevalence	36 (18.18%)	175 (30.7%)	**0.001**
Baseline HCV Prevalence	155(73.46%)	456 (75.50%)	0.557

Table 3 – Risk Factor Differences Between Pill and Non-Injected Cocaine/Heroin Groups			
Drug Initiation Group	**Pills**	**Non-Injected Cocaine/Heroin**	**P-Value**
Ever attended a shooting gallery Yes No	 185 (87.68%) 26 (12.32%)	 513 (84.79%) 92 (15.21%)	0.305
Ever been incarcerated Yes No	 95 (45.02%) 116 (54.98%)	 337 (55.70%) 268 (44.30%)	**0.007**
Ever used crack Yes No	 200 (94.79%) 11 (5.21%)	 553 (91.40%) 52 (8.60%)	0.113
Ever used crystal meth Yes No	 56 (26.54%) 155 (73.46%)	 87 (14.40%) 518 (85.62%)	**<0.001**
Ever used speedball Yes No	 178 (84.36%) 33 (15.64%)	 508 (83.97%) 97 (16.03%)	0.893
Ever been homeless Yes No	 180 (86.12%) 31 (14.69%)	 488 (80.66%) 117 (19.34%)	0.076
Ever tested for HIV Yes No	 200 (94.79%) 11 (5.21%)	 586 (97.34%) 19 (3.14%)	0.075
Injected drugs in last 6 months Yes No	 194 (91.94%) 17 (8.06%)	 538 (88.93%) 67 (11.07%)	0.214
Ever undergone drug treatment Yes No	 190 (90.05%) 21 (9.95%)	 532 (88.08%) 73 (12.07%)	0.439
Mean Age of Alcohol Initiation (SD)	13.8 (4.26)	14.1 (4.16)	0.526
Mean Age of Cigarette Initiation (SD)	14 (6.13)	14.4 (5.35)	0.366
Mean Age of Marijuana Initiation (SD)	14.8 (4.38)	14.9 (3.72)	0.741

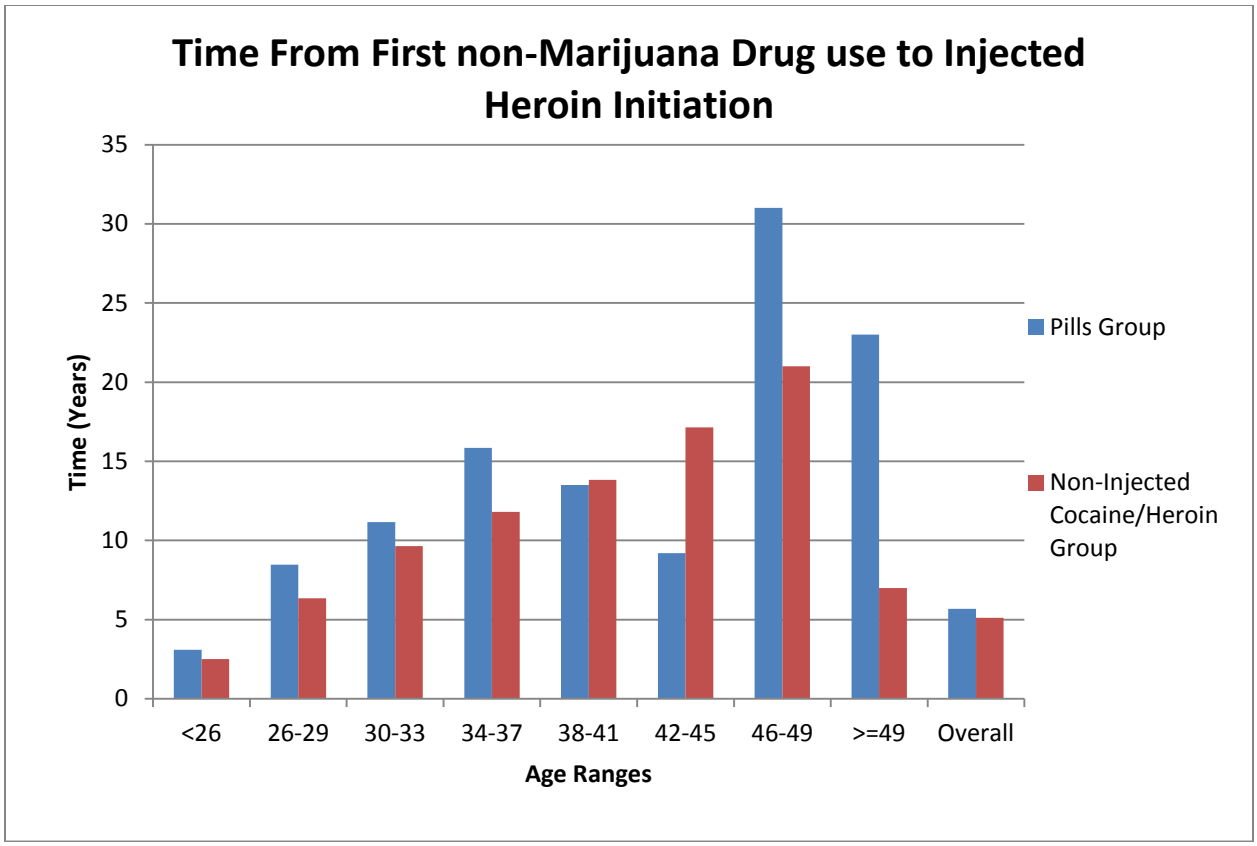

Figure 2 - Time to Injected Heroin Initiation by Age Range

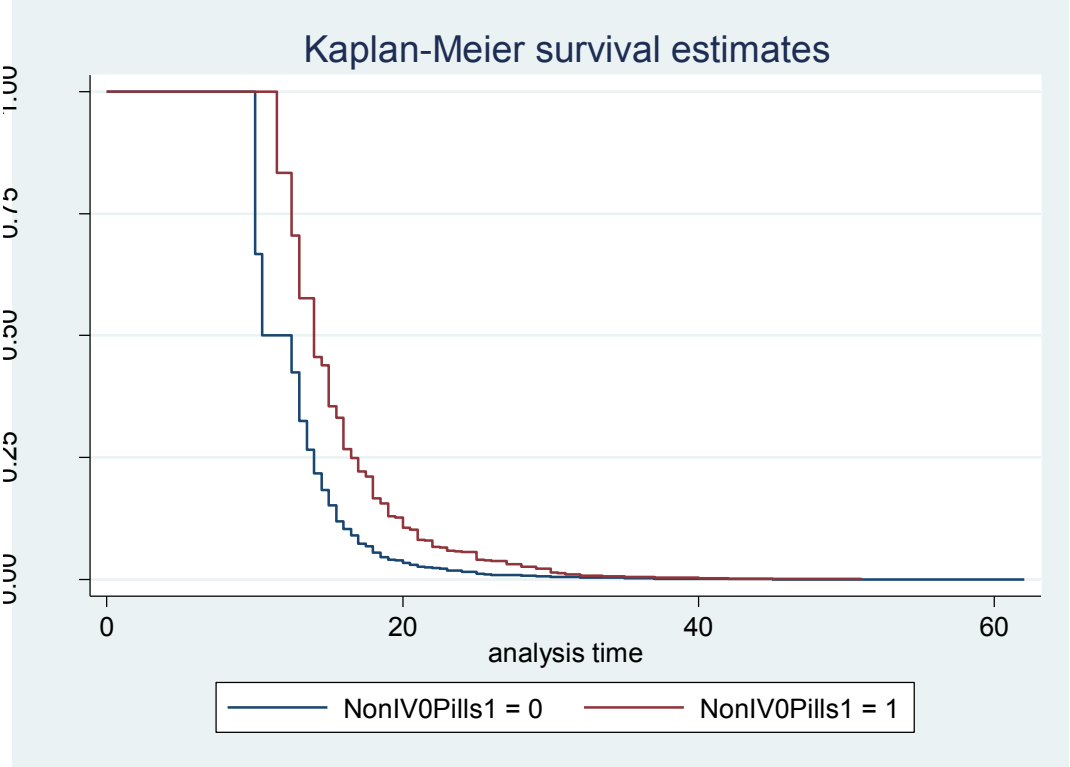

Figure 3 - Kaplan Meier Survival Curve comparing participants who initiated with pills compared to those who initiated with non-injected cocaine/heroin.

References:

1. Goldsamt LA, Harocopos A, Kobrak P, Jost JJ, Clatts MC. Circumstances, pedagogy and rationales for injection initiation among new drug injectors. *J Community Health*. 2010;35(3):258-267.

2. AVERT. People who inject drugs and HIV/AIDS
 people who inject drugs and HIV/AIDS people who inject drugs and HIV/AIDS. http://www.avert.org/people-inject-drugs-hiv-aids.htm. Updated 2014. Accessed 3/15, 2015.

3. Robaeys G, Grebely J, Mauss S, et al. Recommendations for the management of hepatitis C virus infection among people who inject drugs. *Clin Infect Dis*. 2013;57 Suppl 2:S129-37.

4. Budd J, Robertson R. Hepatitis C and general practice: The crucial role of primary care in stemming the epidemic. *Br J Gen Pract*. 2005;55(513):259-260.

5. Sherman SG, Smith L, Laney G, Strathdee SA. Social influences on the transition to injection drug use among young heroin sniffers: A qualitative analysis. *International Journal of Drug Policy*. ;13(2):113-120.

6. Fuller CM, Vlahov D, Arria AM, Ompad DC, Garfein R, Strathdee SA. Factors associated with adolescent initiation of injection drug use. *Public Health Rep*. 2001;116 Suppl 1:136-145.

7. Center for Disease Control. Prescription drug use continues to increase: U.S. prescription drug data for 2007–2008. . 2010;42.

8. National Institutes of Health. Trends in prescription drug abuse. http://www.drugabuse.gov/publications/research-reports/prescription-drugs/trends-in-prescription-drug-abuse. Updated 2014. Accessed 4/1, 2015.

9. Feng C, DeBeck K, Kerr T, Mathias S, Montaner J, Wood E. Homelessness independently predicts injection drug use initiation among street-involved youth in a canadian setting. *J Adolesc Health*. 2013;52(4):499-501.

10. Sherman SG, Fuller CM, Shah N, Ompad DV, Vlahov D, Strathdee SA. Correlates of initiation of injection drug use among young drug users in baltimore, maryland: The need for early intervention. *J Psychoactive Drugs*. 2005;37(4):437-443.

11. Barrett D, Hunt N, Stoicescu C. Injecting drug use among under-18s: A snapshot of available data. . 2013.

12. Lankenau SE, Teti M, Silva K, Bloom JJ, Harocopos A, Treese M. Initiation into prescription opioid misuse among young injection drug users. *Int J Drug Policy*. 2012;23(1):37-44.

13. Cheng Y, Sherman SG, Srirat N, et al. Risk factors associated with injection initiation among drug users in northern thailand. *Harm Reduct J*. 2006;3:10-7517-3-10.

14. Linton SL, Celentano DD, Kirk GD, Mehta SH. The longitudinal association between homelessness, injection drug use, and injection-related risk behavior among persons with a history of injection drug use in baltimore, MD. *Drug Alcohol Depend*. 2013;132(3):457-465.

15. Behavioral Health System Baltimore. BALTIMORE CITY OVERDOSE PREVENTION PLAN & REPORT ON PROGRESS. . 2014.

16. US Department of Health and Human Services, ed. *Problems of drug dependence, 1991: Proceeding of the 53rd annual scientific meeting, the committee on problems of drug dependence, inc.* National Institute of Drug Abuse 53rd Annual Scientific Meeting: ; 1991.

Curriculum Vitae:

I grew up in Miami, Florida, where I was born on the 29th of October 1991. I graduated from the International Baccalaureate program in high school, after which I enrolled in the Johns Hopkins University. There I obtained a Bachelor of Arts in Public Health Studies, and a minor in Spanish for the Professions. During my freshman year I was first exposed to the field of Epidemiology when I became a research assistant for the HIV Research Network and the International Maternal Pediatric Adolescent AIDS Clinical Trials Network (IMPAACT) studies. During the summer of 2013 I was an intern with the Johns Hopkins Center for AIDS Research, where I worked with the AIDS Linked to the IntraVenous Experience (ALIVE) study. These experiences furthered my interest in the field of Epidemiology, and upon graduation (with university and departmental honors) in 2014 I enrolled in the Johns Hopkins Bloomberg School of Public Health to pursue a Master's degree in Epidemiology with a concentration in Infectious Diseases. Starting in August of 2015, I will begin medical school at Warren Alpert Medical School at Brown University. My professional interests include Emergency Medicine, EMS education, clinical research, and Public Health interventions aimed at the prevention of chronic conditions.

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Masters of Health Science Program - Infectious Disease Epidemiology. 2015.

Undergraduate – The Johns Hopkins University. Baltimore, MD. 2014.
Major: Public Health Studies Minor: Spanish for the Professions
University and Departmental honors.

Programming Language Proficiency - Java, SAS, Stata, R.

Honors/Awards/Recognitions
Dean's List: Fall 2011, Spring 2012, Fall 2012, Spring 2013, Fall 2013, Spring 2014.
Johns Hopkins University Bloomberg Scholar 2010 - 2014
Lambda Epsilon Mu Latino Pre-Med Honor Society. The Johns Hopkins University.

Certification/Licensure
Nationally Registered Emergency Medical Technician. (NREMT). Registry#: E3059294. 01/2013.
Emergency Medical Technician (EMT). (MIEMSS). ID#: 0211649. 08/2012.
American Heart Association. BLS and CPR Instructor. Emergency First Responder (EFR) certified. 10/2012.
American Red Cross. Emergency Medical Response (EMR) certified, EMR Instructor Certified. 01/2012.

Research Experience
Johns Hopkins University Center for AIDS Research. Baltimore HIV/AIDS Scholars Program.
Department of Epidemiology. Bloomberg School of Public Health. ALIVE Study. Baltimore, MD.

Sansum Diabetes Research Institute. Summer Intern. Santa Barbara, CA. Summer 2013.
Conducted review of recent clinical research on diabetes and pregnancy under Dr. Lois Jovanovič and submitted a review article for publication. Attended lectures relating to the biological, clinical, and public health impacts of diabetes. Shadowed physicians of a variety of specialties, volunteered with youth fitness groups, and served as Spanish interpreter at various community clinics in the city. Paid internship.

International Maternal Pediatric Adolescent AIDS Clinical Trials (IMPAACT) and HIV Research Network (HIVRN) Johns Hopkins Clinical Trials' Unit. Johns Hopkins Hospital. Baltimore, MD.
Data Manager. Fall 2011 - Present. Clinical Research Assistant. Fall 2010 – May 2015.
Responsible for maintaining, collecting, verifying, and updating the pediatric clinical data that Johns Hopkins Hospital submits to the HIVRN. Additionally, identify and consent clinic patients to enroll into the IMPAACT and observational cohort studies, and maintain the IMPAACT data.

Medical Experience

Hopkins Emergency Response Unit. Reserve Crew Chief. The Johns Hopkins University. Fall 2012 – May 2015. The Hopkins Emergency Response Organization (HERO) provides the Johns Hopkins Homewood Campus and surrounding areas with 24/7, quality emergency medical care. As a Reserve Crew Chief, I take 3 on-call eight hour shifts per week and hold the main authority on scene, including treatment and transport decisions of patients as well as overseeing crew members and Crew Chiefs.

South Miami Hospital Emergency Department. Medical Scribe. Miami, FL Summer 2012 – May 2015. Seasonal. Accompany physicians into examination rooms and document patients' symptoms, physical examination, vital signs, and lab values. Additionally, I look up pertinent past medical records, keep track of and enter results of imaging studies, log progress notes, and document discharge plan including prescriptions.

R. Adams Cowley Shock Trauma Center. Clinical Observation Program. Baltimore, MD. Fall 2011, Spring 2013 Participated in the Trauma Resuscitation Unit to examine the hospital course and treatment of trauma patients, and assisted with physical assessments. Followed patients from arrival to the operating room, translating English/Spanish when needed, went on hospital rounds, observed surgeries and clinical interactions.

Community Service/Volunteer - Medical/Clinical

Johns Hopkins Bayview Medical Center. Health Leads Baltimore. Patient Advocate. Spanish Interpreter. Fall 2010 - Spring 2014. (Formerly Project Health)
Health Leads is a national organization dedicated to assisting underprivileged patients by connecting them to public resources. I work directly with patients to assess and prioritize what resources exist to meet their needs, and determine the best course of action for that client by searching for resources for which they qualify. Often, cases require follow up with both the client and the Department of Social Services and consistent contact with clients until the case is closed. Have gained experience and insight into healthcare and social services network as well as multitasking, communication, and organizational skills. Official Spanish interpreter for the hospital as of fall 2012.

Hopkins Emergency Response Teaching Unit (HERTU). S5, Recruitment, Special Projects and Public Affairs Officer. Spring 2012 - Fall 2012. Operations and Planning Chair. Fall 2011 - Spring 2012. Instructor. Fall 2011 - Spring 2013. Teaching Assistant. Fall 2010 - Fall 2011.
HERTU, a sister organization to the aforementioned HERU, aimed to train new HERU unit members in accordance with the American Red Cross Emergency Medical Response (EMR) curriculum, as well as provide community CPR/AED certification courses out of the Johns Hopkins Homewood campus. Led and organized lectures, while evaluating presentations by TAs and answering student's questions. Ran practices scenarios while giving constructive feedback to students. Ran EMR as well as CPR/AED certification courses and exams. As Operations and Planning Chair, scheduled and prepared lesson plans while maintaining the flow of day to day activities. As S5, recruited students into both the EMR and community CPR/AED courses. Responsible for organizing the courses, team building activities and events.

Miami-Dade Fire Department. Ride Alongs. Air Rescue. Summer 2012. Ambulance. Summer 2011.

Baltimore Eastern Clinic (Baltimore Department of Health). Interpreter (English/Spanish.) Fall 2010. Simultaneous translation between patients and health providers, including extensive use of medical terminology. Worked primarily in the Sexually Transmitted Diseases' Clinic and the Oncology department. Volunteer work through Programa SALUD, a Johns Hopkins University initiative for Hispanic/Latino Health.

Publications

Adrian Cotarelo, Homaira Zaman, Lois Jovanovič, MD, Moshe Hod, MD. *Advanced Technologies and Treatments in Diabetes 2013 Yearbook, Chapter 8: Technology and Pregnancy*. The Advanced Technologies and Treatments in Diabetes (ATTD) Yearbook is a review of the most current, groundbreaking research in the field of diabetes management and prevention. Also available as an online journal supplement and indexed/abstracted in MEDLINE, PubMed, and other databases.

Adrian Cotarelo, Nancy Hutton, MD, FAAP, and Allison Agwu, MD, ScM, FAAP. *The Unfortunate Disconnect: Profoundly Immunosuppressed Vertically Infected HIV Patients with Poor Understanding of Morbidity and Mortality.* Poster presented at the Pediatric Academic Societies' Annual Meeting in Washington, DC. May 2013.
Oral presentation at the 5th Annual Undergraduate Conference in Public Health at Johns Hopkins University. Spring 2014

Adrian Cotarelo. "Damaging Effects of Irresponsible Media Reporting on the Agricultural Industry." 3rd Place, Future Farmers of America Prepared Speech Division at the Miami-Dade County Northern region competition. December 2009.

Adrian Cotarelo. "Hybridizing Orchids of the Cattleya Alliance." Research paper selected for the 2007 Future Farmers of America State Conference in Orlando, FL.

Language Fluency

English (Native)
Spanish (Native/functionally native)
French (Basic)

Other Experience

Tutoring – Organic Chemistry. Self-Employed. Fall 2013 - Present.
Hopkins Hosting Society. Volunteer. Spring 2011-Fall 2011. Leadership Board. Spring 2012 - Fall 2012.
Hopkins Multicultural Students Association. Volunteer.